

Systolic clicks with ventricular septal defects¹ *A sign of aneurysm of ventricular septum?*²

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A series of 20 cases is described of children with ventricular septal defects, in whom it was thought that a systolic ejection sound was heard. These were recorded using an accelerometer phonocardiographic technique which was particularly useful in childhood and infancy. Ten of these cases showed an early systolic click, the other 10 showed a split first heart sound. Three of the cases with a systolic ejection click were shown at angiocardiology to have an aneurysm of the interventricular septum. The relation between the ejection click and the aneurysm of the ventricular septum is discussed.

Rowe (1970) has suggested that some ventricular septal defects (VSD) with an aneurysm of the membranous interventricular septum might be associated with a systolic 'click'. We studied the phonocardiograms of 20 patients considered clinically to have click-like sounds in the lower praecordium, which we considered similar to those described by Rowe.

Methods

The diagnosis of ventricular septal defect was made by clinical, radiological, and electrocardiographic data, and confirmed by cardiac catheterization in 7 children. Phonocardiograms were made with a photographic recorder³ set at 50 mm/sec paper speed using an accelerometer technique (Pickering, 1969; Bew *et al.*, 1971) particularly suited to recording soft, high frequency clicks in infants. An electrocardiogram standard lead II was simultaneously recorded for timing the Q-click interval.

Results

The results of phonocardiography are summarized in the Table.

An aneurysm of the interventricular septum (A) is shown in the angiocardiology (Fig. 1)

of Case 1 with the corresponding electrocardiogram and phonocardiogram (Fig. 2).

Of the 20 cases examined, 12 were found to have clicks at 0.11-0.17 sec after the Q wave. Seven had a split first sound that simulated a click, and one had a bicuspid aortic valve.

TABLE Added sounds recorded in 20 patients with ventricular septal defect

Case No.	Age (yr)	Cardiac catheterization		Added sound	Q sound interval (sec)
		Age (yr)	Pulmonary systolic flow ratio		
1	1.5	0.25	1/1	Systolic click	0.11
2	6.6			Systolic click	0.10-0.13
3	11.5	9.0	2/1	Split first sound	0.09
4	11.5	9.0	1.2/1	Split first sound	0.08
5	13.2	8.0	1.3/1	Systolic click	0.14-0.16
6	17.6			Split first sound	0.087
7	17.75			Split first sound	0.11
8	11.5	11.0	1/1	Ejection click*	0.103
9	12.08			Split first sound	0.09
10	12.4			Split first sound	0.09
11	12.0			Split first sound	0.085
12	8.0			Systolic click	0.121
13	2.08			Systolic click	0.134
14	10.4			Systolic click	0.121
15	15.32			Systolic click	0.116
16	14.5	11.0	1.1/1	Systolic click	0.12
17	35.25			Systolic click	0.17
18	9.16			Systolic click	0.14-0.16
19	15.1			Systolic click	0.15-0.16
20	7.25	5.25	1.4/1	Systolic click	0.12-0.16

* Bicuspid aortic valve.

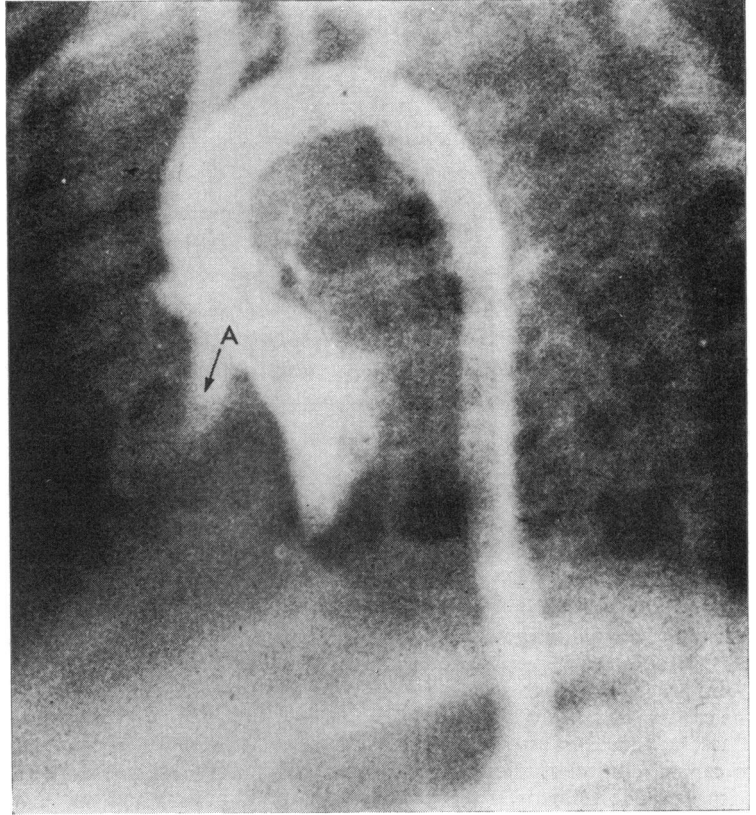
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FIG. 1 Case 1. Left ventricular angiocardio-gram showing aneurysm (A) of membranous interventricular septum.



Discussion

The ventricular septal defect systolic click was best recorded in the fourth intercostal space at the left sternal border, was loudest during expiration, and was of high frequency, low intensity (about $1/8$ to $1/4$ that of the first heart sound), and occurred 0.11 to 0.17 sec after the Q wave. This later timing of the click distinguished it from a split first heart sound recorded normally at 0.07 and 0.09 sec after Q, while the location and low intensity distinguished it from an aortic ejection click. Though the 'VSD' systolic click was commoner in older patients, our youngest was 18 months old.

Pombo, Pilapil, and Lehan (1970) described 4 cases of aneurysm of the membranous interventricular septum diagnosed by angiocardio-gram. The phonocardiogram of their third case showed a systolic click similar to that described above, though they did not comment on this. We speculate that the systolic click is related to the type of aneurysm in our Cases 1 and 16. The sound is produced in much the same way as the sound of a sail when it catches the wind.

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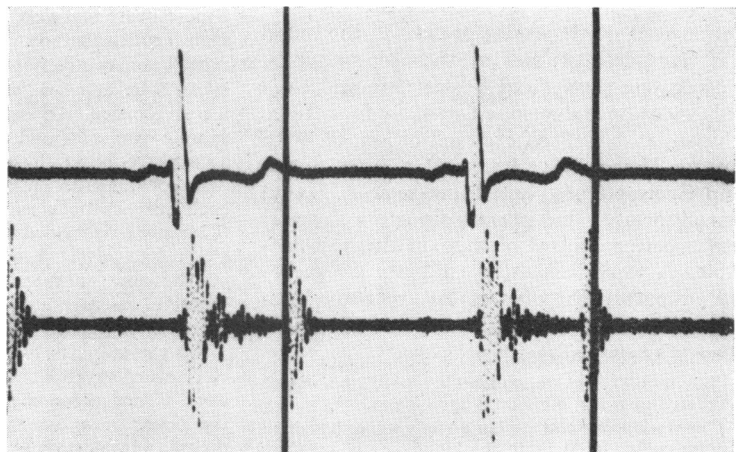


FIG. 2 Case 1. Combined electrocardiogram and phonocardiogram showing systolic click.